Graduate School

Graduate School
What I Wish I Knew in Third Year

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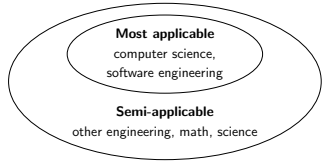
- Introduce myself and the presentation
- Q & A session at the end with professors
- Slides are online, with some extra links at the end



- Originally designed this for 3A/3B SE
- This is the presentation I wish I had in third year
- I knew very little about grad school
- Learned on my own, and now sharing my knowledge
- This presentation is less applicable for other fields

- I've been a graduate student (doing research) for a year
- Also have some research experience from undergrad
- I've done research co-op, URA, and Capstone
- I applied to grad schools in Canada/US, including Waterloo

My Experiences

Industry experiences:

- Telecommunications, web development startup
- Most recently: Visual C++ compiler at Microsoft

- Also have industry experience
- Worked in telecom, two terms in a Rails startup with only two other devs
- Two terms (plus summer internship) with VS at Microsoft, most recently on their C++ compiler
- I think I have a pretty good idea of both sides

- Definition: school after you have your bachelor's degree
- Need to clarify before going further: two kinds of grad school
- Course-based degree: you pay tuition and take courses
- You are a consumer of knowledge
- Examples: law school, med school, MBA, MMath (UW CS), MEng (UW ECE)

Research-based Degree

- Paid to do research (produce new knowledge)
- Examples: MMath, MASc, PhD
- See also Matt Might's illustrated guide to a Ph.D.

After this point, "graduate school" refers to research.

- Research-based degree: you are paid a salary to do research
- You are a producer of knowledge
- Matt Might (prof at University of Utah) has a nice little comic
- Examples: MMath (UW CS), MASc (UW ECE), PhD
- Note that at Waterloo, MMath is used for both course and thesis master's degrees
- In the US, "master's" typically means course-based
- But often a US master's is earned en-route to a PhD

Reasons for Graduate School

Philip Guo offers three practical reasons:
- Make a name for yourself
- Fail in a safe environment
- Choose from more jobs

In other words, "trade money for freedom."

- There are many different reasons
- Many of them can be personal
- Philip Guo (professor at University of Rochester) offers three practical reasons
- Make a name for yourself, fail in a safe environment, choose from more jobs
- In other words, "trade money for freedom"

- Formulate, execute, and sell your ideas
- Come up with an idea, implement or test it, then write papers and give presentations
- It's your work
- "On your own," but you get mentoring from peers and professors
- Note: startups are another way to do this

- Grad school is uncertain and challenging
- There will be a lot of failure (ideas shot down, papers rejected, etc.)
- "What doesn't kill you makes you stronger"
- Grit, tenacity, and perseverance
- These are good skills to have in any job
- In other jobs, failure may result in consequences (getting fired, not getting promoted, losing your startup, etc.)
- Though you don't necessarily need failure to develop these skills

Choose From More Jobs

- Co-op experiences makes us very employable at graduation
- A PhD can open even more opportunities
  - Corporate research, academic research, teaching

Trade money for freedom.

- We are very employable after graduation
- Many of us get full-time offers by our last co-op term
- And if you don't have an offer, you still have job experience and interview skills
- But a PhD opens more doors for your career
- New opportunities are also different, and have more intellectual freedom
- Caveat: getting out of touch after you get your PhD
- Can maintain skills with internships

Reasons Against Graduate School

You might not want to consider graduate school if you:

- like working in industry
- find it important to make a good salary now

Graduate school might not result in a higher salary later, either.

- There are reasons to not go to graduate school
- If like working in industry or don't like research
- If it's important to make a good salary
- Salary can be 3 to 4 times lower in grad school
- Graduate degree might not result in a higher salary later
- It depends on the company and position: some don't care
- Another factor to consider is the time investment
- A master's might be worth it: the salary bump might be able to pay off the time investment
- But a PhD takes too long, and will cost you money

- Let's say you're sold and now want to apply for grad school
- You'll apply 1 year before you expect to start
- For SE students, this will be during your last co-op
- Can be difficult if you're not in Waterloo
- Application is a job application, so you'll need experience or potential
- Publications = experience
- Matt Might lists three qualities of successful PhD students
- Perseverance and tenacity: Getting a PhD is open-ended, uncertain, and full of rejection/failure
- Cogency: Ability to articulate ideas, in papers and presentations

Research Experience
- Work with different professors
- Opportunities:
  - Co-op, URA, Capstone, SE 499

- Working with different professors gives you multiple reference letters
- Opportunities: co-op, URA, Capstone, SE 499
- May have to go "outside JobMine" for research co-ops
- URA can be difficult, since it's on top of your course work
- Research experience is encouraged even if you're not sure about grad school
- Try something out, see if you like it, keep your options open
- If you don't do it, you're closing doors
- Easier to jump off the research path than jump onto it

Letters of Recommendation

- Need 2–3 letters
- Strong, academic references
  - Professor you've done research with
- "Course" letter
  - Professor whose course you excelled in
- Industry letter
  - Demonstrated qualities appropriate for research
  - Some programs won't accept these letters

- 2–3 letters, depending on the program
- Best letter is the strong academic letter, from a prof you worked with
- Ideally you'd want 3, but 2 is OK
- Course letter is from a prof whose class you took and excelled in
- Good courses: small class, large open-ended project
- Industry letter from an employer who can write about your perseverance, tenacity, and cogency
- But note that some programs won't accept these letters
- Waterloo ECE will, but Waterloo CS will not

- Convince admissions committee that you are a strong candidate
- Describe your research experience and interests

- Purpose is to convince admissions committee that you are a strong candidate
- Mostly you'll be writing about research experience and interests
- Other things: why you got into research, research plans, career plans

Other Application Materials

- Resume
- Grades
  - May or may not be a cutoff
- Graduate Record Examinations (GREs)
  - Standardized test (similar to SATs)
  - For US schools

- The most important thing is research experience
- Importance of resume, grades, and GREs depends on the school
- Grade cutoff at Waterloo is 78% (CS and ECE)
- US schools will use GPA, so you'll have to convert
- Study for GREs early, before you get too specialized in CS and rusty in basic math
- GRE scores are usually good for up to five years
- Also, grades *are* relevant for scholarships

Summary

- What is graduate school?
  - A job to do research: produce new knowledge
- Reasons for graduate school?
  - Make a name for yourself, fail in a safe environment, choose from more jobs
- How to apply to graduate school?
  - Get research experience, which gets you essay material and letters

- There are three takeaway messages from this presentation
- Grad school is a job to do research, to produce new knowledge
- Three reasons for grad school: make a name for yourself, fail in a safe environment, choose from more jobs
- To apply, you'll need research experience
- If you're not sure and want to keep your options open, get research experience

Graduate School

Further Reading

- "Applying to Ph.D. Programs" is written by a professor at CMU
- *The Ph.D. Grind* is an ebook by Philip Guo about his PhD experience